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Filed : January 27, 2004

**SPECIFICATION AMENDMENTS:**

Please replace the title "INTERCHANGEABLE TOOL HEADS" with the following title: --A CLEANING IMPLEMENT WITH INTERCHANGEABLE TOOL HEADS--, as suggested by the Examiner.

Please replace the paragraph [0037] with the following amended paragraph.

[0037] Fig. 3A shows the activation mechanism of the cleaning implement in which a first end of rod 31 within pole 14 is connected to an activation lever with arms 78,79 and which is pivotally connected to fixed pin 80 within cradle ~~26~~76. The second end of rod 31 is connected to the trigger (not shown). Pole 14 is attached to cleaning head 12 onto which a cleaning pad 40 is attached with the aid of stays 42, 44. Positioned within cradle ~~26~~76 is canister 24 with its cap 72 properly arranged so that nozzle 145 of the canister is aligned with aperture 71. Cap 72 includes a valve actuator 23 which is hingedly connected to the cap. The canister contains a pressurized cleaning fluid as further described herein.

Please replace the paragraph [0055] with the following amended paragraph.

[0055] Besides being affixed onto stays, the cleaning pad may also be attached to the cleaning head with hook and loop type fasteners which are commercially available under the trade name VELCRO®, or the cleaning pad may be attached with adhesives.

Paragraph [00134], was split unintentionally, thus creating an additional and unnecessary paragraph [00135]. Paragraph [00134] has been rewritten to include the original text from both paragraphs [00134] and [00135]. The combining of paragraphs [00134] and [00135] causes all subsequent paragraphs to decrease in number by one. Please replace former paragraphs [00134] – [00177] by the following amended and renumbered paragraphs ([00134] – [00176]).

[00134]Optional miticides include boron compounds and salts, including boric acid, borates, octaborate, tetraborate, borax, and metaborate. Other optional miticides

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include benzylbenzoate, phenyl salicylate, diphenylamine, methyl p-naphthyl ketone, coumarin, phenethyl benzoate, benzyl salicylate, phenyl benzoate, N-fluorodichloromethylthio-cyclohexene-dicarboxyimide, p-nitrobenzoic acid methyl ester, p-chlorometaxyleneol, bromocinnamic aldehyde, 2,5-dichloro-4-bromophenol, N,N-dimethyl-N'-tryl-N'-(fluorodichloromethylthio)-sulfamide, 2-phenylphenol, sodium 2-phenylphenolate, 5-chloro-2-methyl-4-isothiazoline-3-one, 2-methyl-4-isothiazonoline-3-one, benzimidazolymethyl-carbamate, the antimicrobials listed herein, and mixtures thereof.

~~[00135]dichloro 4 bromophenol, N,N dimethyl N' tryl N' (fluorodichloromethylthio)-sulfamide, 2-phenylphenol, sodium 2-phenylphenolate, 5-chloro-2-methyl-4-isothiazoline-3-one, 2-methyl-4-isothiazonoline-3-one, benzimidazolymethyl-carbamate, the antimicrobials listed herein, and mixtures thereof.~~

~~[00136]~~[00135] Optional anti-allergen metal ions include metallic salts are selected from the group consisting of zinc, stannous, stannic, magnesium, calcium, manganese, titanium, iron, copper, nickel, and mixtures thereof. Other optional anti-allergen agents include polyphenol compounds including tannins, catechins, and gallic acid, hydrogen peroxide, salicylic acid, citric acid, lactic acid, glycolic acid, ascorbic acid, gluconic acid, pyruvic acid, glucaric acid, hydroxy benzoic acid, hydroxyglutamic acid, hydroxyphthalic acids, malic acid, and mixtures and salts thereof.

~~[00137]~~[00136] Film forming polymers can reduce allergens in the air. Suitable film-forming polymers include, water-soluble polymers selected from the group consisting of starch, polyvinyl alcohols, methyl cellulose and its derivatives, polyacrylic acids, polyethylene glycols with molecular weight higher than 5000, polyethylene, polypropylene glycol with molecular weight higher than 8000, Cosmetic Toiletry Fragrances Association polyquaternium compounds 1 through 14, polyvinyl pyrrolidone, and mixtures thereof. Specific examples of certain preferred film forming polymers are selected from the group consisting of hydroxy-propyl starch, DAISEL MC 1310, Kuraray poly vinyl alcohol 205, N-Polyvinyl-2 pyrrolidone, and mixtures thereof.

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~~[00138]~~[00137] As used herein, the term "plant essential oil" or "plant essential oil compound" (which shall include derivatives thereof) generally refers to a monocyclic, carbocyclic ring structure having six-members and substituted by at least one oxygenated or hydroxyl functional moiety. Examples of plant essential oils encompassed within the present invention, include, but are not limited to, members selected from the group consisting of aldehyde C16 (pure),  $\alpha$ -terpineol, amyl cinnamic aldehyde, amyl salicylate, anisic aldehyde, benzyl alcohol, benzyl acetate, cinnamaldehyde, cinnamic alcohol, carvacrol, carveol, citral, citronellal, citronellol, p-cymene, diethyl phthalate, dimethyl salicylate, dipropylene glycol, eucalyptol (cineole), eugenol, iso-eugenol, galaxolide, geraniol, guaiacol, ionone, menthol, menthyl salicylate, methyl anthranilate, methyl ionone, methyl salicylate,  $\alpha$ -phellandrene, pennyroyal oil, perillaldehyde, 1- or 2-phenyl ethyl alcohol, 1- or 2-phenyl ethyl propionate, piperonal, piperonyl acetate, piperonyl alcohol, D-pulegone, terpinen-4-ol, terpinyl acetate, 4-tert-butylcyclohexyl acetate, thyme oil, thymol, metabolites of trans-anethole, vanillin, ethyl vanillin, cedarwood oil, hexadecyltrimethylammonium chloride, aluminium chlorohydrate, 1-propoxy-propanol-2, polyquarternium-10, silica gel, propylene glycol alginate, ammonium sulphate, hinokitiol, L-ascorbic acid, tannic acid and derivatives, chlorohexidine, maleic anhydride, hinoki oil, a composite of AgCl and TiO<sub>2</sub>, diazolidinyl urea, 6-isopropyl-m-cresol, urea, cyclodextrin, hydrogenated hop oil, polyvinylpyrrolidone, N-methylpyrrolidone, the sodium salt of anthraquinone, potassium thioglycolate, and glutaraldehyde, jasmone, dihydrojasmone, lower alkyl esters of jasmonic acid, lower alkyl esters of dihydrojasmonic acid, farnesol, nerolidol, phytol, isophytol, geranylgeraniol, and the like. The essential oil can also be selected from oil is selected from the group of Anise, Balsam, Basil, Bay, Birch, Cajeput, Camphor, Caraway, Cinnamon, Clove, Coriander, Dill, Fennell, Fir, Garlic, Lavender, Lavandin, Lemongrass, Marjoram, Nutmeg, Peppermint, Pine, Rosemary, Rue, Sage, Spearmint, Tea Tree, Thuja, Thyme, Wintergreen and Ylang-Ylang. Preferred essential oils include  $\alpha$ -terpineol, eugenol, cinnamic alcohol, benzyl acetate, 2-phenyl ethyl alcohol, and benzyl alcohol.

#### G. Soil and Stain Resist Agents

~~[00139]~~[00138] Soil resist agents resist or repel dirt, oil, or other typically

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hydrophobic substances from the carpet. Fluorochemical soil-resist agents may include polymers or compounds having pendent or end groups of perfluoroalkyl moieties, fluorosurfactants, or fluoro-intermediates. Examples of some suitable fluorochemical soil-resist agents include ZONYL 7950 and ZONYL 5180, which are available from DuPont. When employed the soil and stain resist agents are preferably present at a level of from 0.01% to 5% and preferably from 0.1 to 1% of the composition

~~[00140]~~[00139] The optional stain-resist agent may also be selected from the group consisting of copolymers of hydrolyzed maleic anhydride with aliphatic alpha olefins, aromatic olefins, or vinyl ethers, poly (vinyl methyl ether / maleic acid) copolymers, homopolymers of methacrylic acid, and copolymers of methacrylic acid. Suitable poly (vinyl methyl ether / maleic acid) copolymers are commercially available, for instance, from ISP Corporation, New York, NY and Montreal, Canada under the product names GANTREZ AN Copolymer (AN-119 copolymer, average molecular weight of 20,000; AN-139 copolymer, average molecular weight of 41,000; AN-149 copolymer, average molecular weight of 50,000; AN-169 copolymer, average molecular weight of 67,000; AN-179 copolymer, average molecular weight of 80,000), GANTREZ S (GANTREZ S97, average molecular weight of 70,000), and GANTREZ ES (ES-225, ES-335, ES-425, ES-435), GANTREZ V (V-215, V-225, V-425). Preferably, the stain-resist agent is ZELAN 338, which is available from DuPont.

~~[00141]~~[00140] Suitable anti-resoiling polymers also include soil suspending polyamine polymers. Particularly suitable polyamine polymers are alkoxylated polyamines including so-called ethoxylated polyethylene amines, i.e., the polymerized reaction product of ethylene oxide with ethyleneimine. Suitable ethoxylated polyethylene amines are commercially available from Nippon Shokubai CO., LTD under the product names ESP-0620A (ethoxylated polyethylene amine wherein  $n=2$  and  $y=20$ ) or from BASF under the product names ES-8165 and from BASF under the product name LUTENSIT K -187/50.

~~[00142]~~[00141] Suitable anti-resoiling polymers also include polyamine N-oxide

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polymers. The polyamine N-oxide polymer can be obtained in almost any degree of polymerization. Typically, the average molecular weight is within the range of 1,000 to 100,000; more preferred 5,000 to 100,000; most preferred 5,000 to 25,000. Suitable poly vinyl pyridine-N-oxide polymers are commercially available from Hoechst under the trade name of Hoe S 4268, and from Reilly Industries Inc. under the trade name of PVNO.

~~[00143]~~[00142] Furthermore, suitable anti-resoiling polymers include N-vinyl polymers. Suitable N-vinyl polymers include polyvinyl pyrrolidone polymers, co-polymers of N-vinylpyrrolidone and N-vinylimidazole, co-polymers of N-vinylpyrrolidone and acrylic acid, and mixtures thereof. Suitable co-polymers of N-vinylpyrrolidone and N-vinylimidazole are commercially available from BASF, under the trade name of Sokalan PG55. Suitable vinylpyrrolidone homopolymers, are commercially available from BASF under the trade names LUVISKOL K15 (viscosity molecular weight of 10, 000), LUVISKOL K25 (viscosity molecular weight of 24,000), LUVISKOL K30 (viscosity molecular weight of 40,000), and other vinyl pyrrolidone homopolymers known to persons skilled in the detergent field (see for example EP-A-262,897 and EP-A-256,696). Suitable co-polymers of N-vinylpyrrolidone and acrylic acid are commercially available from BASF under the trade name SOKALAN PG 310. Preferred N-vinyl polymers are polyvinyl pyrrolidone polymers, co- polymers of N-vinylpyrrolidone and N-vinylimidazole, co-polymers of N-vinylpyrrolidone and acrylic acid, and mixtures thereof, even more preferred are polyvinyl pyrrolidone polymers.

~~[00144]~~[00143] Suitable anti-resoiling polymers also include soil suspending polycarboxylate polymers. Any soil suspending polycarboxylate polymer known to those skilled in the art can be used according to the present invention such as homo- or co-polymeric polycarboxylic acids or their salts including polyacrylates and copolymers of maleic anhydride or/and acrylic acid and the like. Indeed, such soil suspending polycarboxylate polymers can be prepared by polymerizing or copolymerizing suitable unsaturated monomers, preferably in their acid form. Unsaturated monomeric acids that can be polymerized to form suitable polymeric polycarboxylates include acrylic acid,

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maleic acid (or maleic anhydride), fumaric acid, itaconic acid, aconitic acid, mesaconic acid, citraconic acid and methylenemalononic acid. The presence in the polymeric polycarboxylates herein of monomeric segments, containing no carboxylate radicals such as vinylmethyl ether, styrene, ethylene, etc. is suitable provided that such segments do not constitute more than 40%.

~~[00145]~~[00144] \_\_\_\_\_ Particularly suitable polymeric polycarboxylates to be used herein can be derived from acrylic acid. Such acrylic acid-based polymers which are useful herein are the water-soluble salts of polymerized acrylic acid. The average molecular weight of such polymers in the acid form preferably ranges from 2,000 to 10,000, more preferably from 4,000 to 7,000 and most preferably from 4,000 to 5,000. Water-soluble salts of such acrylic acid polymers can include, for example, the alkali metal, ammonium and substituted ammonium salts. Soluble polymers of this type are known materials. Use of polyacrylates of this type in detergent compositions has been disclosed, for example, in U.S. Patent 3,308,067 to Diehl.

~~[00146]~~[00145] \_\_\_\_\_ Acrylic/maleic-based copolymers may also be used as a preferred soil suspending polycarboxylic polymer. Such materials include the water-soluble salts of copolymers of acrylic acid and maleic acid. The average molecular weight of such copolymers in the acid form preferably ranges from 2,000 to 100,000, more preferably from 5,000 to 75,000, most preferably from 7,000 to 65,000. The ratio of acrylate to maleate segments in such copolymers will generally range from 30:1 to 1:1, more preferably from 10:1 to 2:1. Water-soluble salts of such acrylic acid/maleic acid copolymers can include, for example, the alkali metal, ammonium and substituted ammonium salts. Soluble acrylate/maleate copolymers of this type are known materials which are described in EP Application No. 66915. Particularly preferred is a copolymer of maleic / acrylic acid with an average molecular weight of 70,000. Such copolymers are commercially available from BASF under the trade name SOKALAN CP5.

~~[00147]~~[00146] \_\_\_\_\_ Other suitable anti-resoiling polymers include those anti-resoiling polymers having: (a) one or more nonionic hydrophile components consisting essentially

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of (i) polyoxyethylene segments with a degree of polymerization of at least 2, or (ii) oxypropylene or polyoxypropylene segments with a degree of polymerization of from 2 to 10, wherein said hydrophile segment does not encompass any oxypropylene unit unless it is bonded to adjacent moieties at each end by ether linkages, or (iii) a mixture of oxyalkylene units comprising oxyethylene and from 1 to about 30 oxypropylene units wherein said mixture contains a sufficient amount of oxyethylene units such that the hydrophile component has hydrophilicity great enough to increase the hydrophilicity of conventional polyester synthetic fiber surfaces upon deposit of the soil release agent on such surface, said hydrophile segments preferably comprising at least about 25% oxyethylene units and more preferably, especially for such components having about 20 to 30 oxypropylene units, at least about 50% oxyethylene units; or (b) one or more hydrophobe components comprising (i) C<sub>3</sub> oxyalkylene terephthalate segments, wherein, if said hydrophobe components also comprise oxyethylene terephthalate, the ratio of oxyethylene terephthalate: C<sub>3</sub> oxyalkylene terephthalate units is about 2:1 or lower, (ii) C<sub>4</sub>-C<sub>6</sub> alkylene or oxy C<sub>4</sub>-C<sub>6</sub> alkylene segments, or mixtures therein, (iii) poly (vinyl ester) segments, preferably polyvinyl acetate), having a degree of polymerization of at least 2, or (v) C<sub>1</sub>-C<sub>4</sub> alkyl ether or C<sub>4</sub> hydroxyalkyl ether substituents, or mixtures therein, wherein said substituents are present in the form of C<sub>1</sub>-C<sub>4</sub> alkyl ether or C<sub>4</sub> hydroxyalkyl ether cellulose derivatives, or mixtures therein, and such cellulose derivatives are amphiphilic, whereby they have a sufficient level of C<sub>1</sub>-C<sub>4</sub> alkyl ether and/or C<sub>4</sub> hydroxyalkyl ether units to deposit upon conventional polyester synthetic fiber surfaces and retain a sufficient level of hydroxyls, once adhered to such conventional synthetic fiber surface, to increase fiber surface hydrophilicity, or a combination of (a) and (b).

~~[00148]~~[00147] Typically, the polyoxyethylene segments of (a)(i) will have a degree of polymerization of from about 1 to about 200, although higher levels can be used, preferably from 3 to about 150, more preferably from 6 to about 100. Suitable oxy C<sub>4</sub>-C<sub>6</sub> alkylene hydrophobe segments include, but are not limited to, end-caps of polymeric soil release agents such as MO<sub>3</sub>S(CH<sub>2</sub>)<sub>n</sub>OCH<sub>2</sub>CH<sub>2</sub>O-, where M is sodium and n is an integer from 4-6, as disclosed in U.S. Patent 4,721, 580 to Gosselink.

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~~[00149]~~[00148] Anti-resoiling polymers also include cellulosic derivatives such as hydroxyether cellulosic polymers, co-polymeric blocks of ethylene terephthalate or propylene terephthalate with polyethylene oxide or polypropylene oxide terephthalate, and the like. Such anti-resoiling polymers are commercially available and include hydroxyethers of cellulose such as METHOCEL (Dow). Cellulosic anti-resoiling polymers for use herein also include those selected from the group consisting of C<sub>1</sub>-C<sub>4</sub> alkyl and C<sub>4</sub> hydroxyalkyl cellulose; see U.S. Patent 4,000,093 to Nicol, et al. Anti-resoiling polymers characterised by poly(vinyl ester) hydrophobe segments include graft co-polymers of poly(vinyl ester), e.g., C<sub>1</sub>-C<sub>6</sub> vinyl esters, preferably poly(vinyl acetate) grafted onto polyalkylene oxide backbones, such as polyethylene oxide backbones. See EP Application 0 219 048 to Kud, et al. Commercially available anti-resoiling polymers of this kind include the SOKALAN type of material, e.g., SOKALAN HP-220, available from BASF.

~~[00150]~~[00149] One type of preferred anti-resoiling polymers is a co-polymer having random blocks of ethylene terephthalate and polyethylene oxide (PEO) terephthalate. The molecular weight of this anti-resoiling polymers is in the range of from about 25,000 to about 55,000. See U.S. Patent 3,959,230 to Hays and U.S. Patent 3,893,929 to Basadur.

~~[00151]~~[00150] Another preferred anti-resoiling polymers is a polyester with repeat units of ethylene terephthalate units which contains 10-15% of ethylene terephthalate units together with 90-80% of polyoxyethylene terephthalate units, derived from a polyoxyethylene glycol of average molecular weight 300-5,000. Examples of this polymer include the commercially available material ZELCON 51260 (from Dupont) and MILEASE T (from ICI). See also U.S. Patent 4,702,857 to Gosselink.

~~[00152]~~[00151] Another preferred anti-resoiling polymers agent is a sulfonated product of a substantially linear ester oligomer comprised of an oligomeric ester backbone of terephthaloyl and oxyalkyleneoxy repeat units and terminal moieties covalently attached to the backbone. These anti-resoiling polymers are fully described in



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U.S. Patent 4,968,451 to Scheibel and Gosselink. Other suitable anti-resoiling polymers include the terephthalate polyesters of U.S. Patent 4,711,730 to Gosselink et al, the anionic end-capped oligomeric esters of U.S. Patent 4,721,580 to Gosselink, and the block polyester oligomeric compounds of U.S. Patent 4,702,857 to Gosselink.

~~[00153]~~[00152] Preferred anti-resoiling polymers also include the soil release agents that are disclosed in U.S. Patent 4,877,896 to Maldonado et al, which discloses anionic, especially sulfoaroyl, end-capped terephthalate esters.

~~[00154]~~[00153] Still another preferred anti-resoiling agent is an oligomer with repeat units of terephthaloyl units, sulfoisoterephthaloyl units, oxyethyleneoxy and oxy-1,2-propylene units. The repeat units form the backbone of the oligomer and are preferably terminated with modified isethionate end-caps. A particularly preferred anti-resoiling agent of this type comprises about one sulfoisophthaloyl unit, 5 terephthaloyl units, oxyethyleneoxy and oxy-1,2-propyleneoxy units in a ratio of from about 1.7 to about 1.8, and two end-cap units of sodium 2-(2- hydroxyethoxy)-ethanesulfonate. Said anti-resoiling agent also comprises from about 0.5% to about 20%, by weight of the oligomer, of a crystalline- reducing stabilizer, preferably selected from the group consisting of xylene sulfonate, cumene sulfonate, toluene sulfonate, and mixtures thereof. See U.S. Pat. No. 5,415,807 to Gosselink et al.

#### H. Builder and Buffering Agents

~~[00155]~~[00154] The cleaning composition may include a builder detergent which increase the effectiveness of the surfactant. The builder detergent can also function as a softener and/or a sequestering and buffering agent in the cleaning composition. When employed, the builder detergent comprises at least about 0.001% and typically about 0.01-5% of the cleaning composition. A variety of builder detergents can be used and they include, but are not limited to, phosphate-silicate compounds, zeolites, alkali metal, ammonium and substituted ammonium polyacetates, trialkali salts of nitrilotriacetic acid, carboxylates, polycarboxylates, carbonates, bicarbonates, polyphosphates, aminopolycarboxylates, polyhydroxysulfonates, and starch derivatives.

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~~{00156}~~{00155} Builder detergents can also include polyacetates and polycarboxylates. The polyacetate and polycarboxylate compounds include, but are not limited to, sodium, potassium, lithium, ammonium, and substituted ammonium salts of ethylenediamine tetraacetic acid, ethylenediamine triacetic acid, ethylenediamine tetrapropionic acid, diethylenetriamine pentaacetic acid, nitrilotriacetic acid, oxydisuccinic acid, iminodisuccinic acid, mellitic acid, polyacrylic acid or polymethacrylic acid and copolymers, benzene polycarboxylic acids, gluconic acid, sulfamic acid, oxalic acid, phosphoric acid, phosphonic acid, organic phosphonic acids, acetic acid, and citric acid. These builder detergents can also exist either partially or totally in the hydrogen ion form.

~~{00157}~~{00156} The builder agent can include sodium and/or potassium salts of EDTA and substituted ammonium salts. The substituted ammonium salts include, but are not limited to, ammonium salts of methylamine, dimethylamine, butylamine, butylenediamine, propylamine, triethylamine, trimethylamine, monoethanolamine, diethanolamine, triethanolamine, isopropanolamine, ethylenediamine tetraacetic acid and propanolamine.

~~{00158}~~{00157} Buffering and pH adjusting agents, when used, include, but are not limited to, organic acids, mineral acids, alkali metal and alkaline earth salts of silicate, metasilicate, polysilicate, borate, carbonate, carbamate, phosphate, polyphosphate, pyrophosphates, triphosphates, tetraphosphates, ammonia, hydroxide, monoethanolamine, monopropanolamine, diethanolamine, dipropanolamine, triethanolamine, and 2-amino-2-methylpropanol. Preferred buffering agents for compositions of this invention are nitrogen-containing materials. Some examples are amino acids such as lysine or lower alcohol amines like mono-, di-, and tri-ethanolamine. Other preferred nitrogen-containing buffering agents are tri(hydroxymethyl) amino methane (HOCH<sub>2</sub>)<sub>3</sub>CNH<sub>3</sub> (TRIS), 2-amino-2-ethyl-1,3-propanediol, 2-amino-2-methylpropanol, 2-amino-2-methyl-1,3-propanol, disodium glutamate, N-methyl diethanolamide, 2-dimethylamino- 2-methylpropanol (DMAMP), 1,3-bis(methylamine)-cyclohexane, 1,3-diamino-propanol N,N'- tetra-methyl-1,3-diamino-2-propanol, N,N-

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bis(2-hydroxyethyl)glycine (bicine) and N-tris(hydroxymethyl)methyl glycine (tricine). Other suitable buffers include ammonium carbamate, citric acid, acetic acid. Mixtures of any of the above are also acceptable. Useful inorganic buffers/alkalinity sources include ammonia, the alkali metal carbonates and alkali metal phosphates, e.g., sodium carbonate, sodium polyphosphate. For additional buffers see McCutcheon's *Emulsifiers and Detergents*, North American Edition, 1997, McCutcheon Division, MC Publishing Company Kirk and WO 95/07971.

### **Propellant**

~~[00159]~~[00158] The cleaning composition is delivered in the form of an aerosol with the aid of a propellant which can comprise, for example, a hydrocarbon, of from 1 to 10 carbon atoms, such as methane, ethane, n-propane, n-butane, isobutane, n-pentane, isopentane, and mixtures thereof. The propellant may also be selected from halogenated hydrocarbons including, for example, fluorocarbons, chlorocarbons, chlorofluorocarbons, and mixtures thereof. (Besides of concerns about the destruction of the stratosphere's ozone layer, the use of fluorocarbons and chlorofluorocarbons is less preferred.) Examples of other suitable propellants are found in P.A. Sanders *Handbook of Aerosol Technology* (Van Nostrand Reinhold Co.) (1979) 2nd Ed., pgs. 348-353 and 364-367, which are incorporated by reference herein. Further, non-hydrocarbon propellants may be possible, such as carbon dioxide, nitrogen, compressed air, and, possibly, dense or supercritical fluids.

~~[00160]~~[00159] A liquefied gas propellant mixture comprising about 85% isobutane and 15% propane is preferred because it provides sufficient pressure to expel the cleaning composition from the container and provides good control over the nature of the spray upon discharge of the aerosol formulation. Preferably, the propellants comprises about 1% to 50%, more preferably about 2% to 25%, and most preferably about 5% to 15% of the aerosol formulation.

~~[00161]~~[00160] The aerosol formulation, which is the mixture of cleaning composition and propellant, is preferably stored in and dispensed from a pressurized can

that is equipped with a nozzle so that an aerosol of the formulation can be readily sprayed onto a surface. In loading the dispenser, the non-propellant components of the aerosol formulation are mixed into a concentrate and loaded into the dispenser first. Thereafter, the liquefied gaseous propellant is inserted before the dispenser is fitted with a nozzle.

~~[00162]~~[00161] In normal aerosol carpet cleaning, the foam can be very stable up to 5 to 10 minutes. Because this cleaning implement is designed to clean large areas easily, it is preferred that the foam be visible and consumer noticeable, however, it should be easily dispersed. The preferred foam of the invention is stable for only 1 to 2 minutes. The cleaning pad may contain antifoam ingredients that cause the foam to break as the cleaning head is moved over the foam.

#### **Tool Head Interchangeability**

~~[00163]~~[00162] One embodiment of the invention involves treating a work surface with a system that can accommodate a variety of tool heads for a variety of purposes. Any surface can be treated. Examples of work surfaces include floors, carpets, countertops, windows, walls, ceilings, bathroom surfaces, outdoor surfaces, automobile exteriors and interiors, fences, patios, ground, and landscaping. Any number of treatments can be carried out on the work surfaces. Treatments that involve application of a fluid are possible. Treatments that involve wiping or scrubbing with or without a fluid are also possible. Examples of treatments include applying, cleaning, scrubbing, waxing, polishing, disinfecting, killing mites, killing fleas, detoxifying, neutralizing allergens, painting, and removing liquids.

~~[00164]~~[00163] Figure 14 is a schematic representation of a system for treating a work surface showing a tool head interchangeability embodiment. A system 100 includes a handle portion 110 that has a coupling 120 at one end. A tool head 130-1 has a coupling 120-1 that can make a detachable connection to the coupling 120 on the handle 110. In this embodiment, the tool head 130-1 attaches to coupling 120 via the tool head's 130-1 own coupling 120-1 in a slot and key arrangement. This, however, is merely meant to illustrate the invention and is not limiting of the manner or materials in which

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the head attaches to the handle 110. There is also a removable pad 140-1 that can attach to a surface of the tool head 130-1. The connection between coupling 120 and 120-1 can include one or more axes of rotation (not shown) to allow for reaching into difficult areas of the work surface. There can also be one or more locking mechanisms (not shown) with which a user can secure any or all of the axes in a fixed position as desired. The tool head can include configurations such as squeegees, scrubbers, rollers, slides, flat surfaces, surfaces having patterned high spots and low spots, irregular surfaces, brushes, and pads. In some arrangements, a tool head can include an electric motor to facilitate treatment of a work surface. The electric motor can cause devices such as brushes, scrubbers, rollers or even the whole tool head and attached pad to move in a lateral or rotational pattern or a random motion.

~~[00165]~~[00164] A second tool head 130-2 is also shown in Figure 14. The second tool head 130-2 has a coupling 120-2 that can make a detachable connection to the coupling 120 on the handle 110. There is also an optional removable pad 140-2 that can attach to a surface of the tool head 130-2. The connection between coupling 120 and 120-2 can include one or more axes of rotation (not shown) to allow for reaching into difficult areas of the work surface. There can also be one or more locking mechanisms (not shown) with which a user can secure any or all of the axes in a fixed position as desired. The tool head 130-2 may be configured as described above for tool head 130-1.

~~[00166]~~[00165] A fluid reservoir 150-1 is also included, which can be removably or permanently attached to the system 100. The attachment can occur in any place on the system. In some arrangements, the fluid reservoir 150-1 is attached to the handle portion 110. In other arrangements there is a cradle (not shown) on the handle portion 110 which can hold the fluid reservoir in place. In yet other arrangements, the fluid reservoir 150-1 can attach to the tool head 130-1. The fluid reservoir 150-1 can contain a fluid and can deliver the fluid to a work surface. The fluid can be any fluid useful for performing the treatment on the work surface. Examples of fluids that can be used for treatments include water, detergents, soaps, wax, disinfectants, miticides, pesticides, allergen neutralizers, detoxifying agents, fertilizers, paints, and solvents. The reservoir 150-1 can include a

controller (not shown) for releasing and stopping fluid flow. In some arrangements the controller can be activated by a mechanism on the handle. In some arrangements the controller can be located adjacent or as part of a hand gripping surface (not shown) at the end of the handle portion 110 opposite the coupling 120. Examples of the types of fluid reservoir 150-1 include gravity flow, physical pumped, pressurized, electronically pumped, and aerosol. The fluid reservoir 150-1 is intended for use with the tool head 130-1 and the removable pad 140-1, all for the purpose of effecting a particular treatment on a work surface.

~~[00167]~~[00166] The system 100 can also include an optional second fluid reservoir 150-2 that can have some or all of the properties of the fluid reservoir 150-1. The fluid reservoir 150-2 is intended for use with the tool head 130-2 and the optional removable pad 140-2, all for the purpose of effecting a particular treatment on a work surface. The fluid reservoirs 150-1, 150-2 can be removably or permanently attached to the system 100 in any of a number of ways. The reservoirs 150-1, 150-2 can be separate containers and each can attach independently to the system 100 either along the handle portion 110 or on their respective tool heads 130-1, 130-2. The reservoirs 150-1, 150-2 can each attach separately to individual cradles (not shown) located on the system 100. The reservoirs 150-1, 150-2 can both attach to one cradle (not shown) located on the system 100. The reservoirs 150-1, 150-2 can each be a separate section of one container (not shown), and the container can be attached to the system 100 in any of the ways discussed above.

~~[00168]~~[00167] Figure 15 is a schematic representation of a system for treating a work surface. A system 200 includes a handle portion 210 that has a coupling 220 at one end. A tool head 230-1 has a coupling 220-1 that is shown connected to the coupling 220 on the handle 210. There is also a removable pad 240-1 that is attached to a surface of the tool head 230-1. The connection between coupling 220 and 220-1 can include one or more axes of rotation (not shown) to allow for reaching into difficult areas of the work surface. There can also be one or more locking mechanisms (not shown) with which a user can secure any or all of the axes in a fixed position as desired.

~~[00169]~~[00168] There is also a fluid reservoir 250-1 attached to the system 200. The fluid reservoir 250-1 (and the fluid within) is intended for use with the tool head 230-1 and the removable pad 240-1, all for the purpose of effecting a particular treatment on a work surface. An additional optional fluid reservoir 250-2 is attached to the system 200. The fluid reservoir 250-2 (and the fluid within) can also be used with the tool head 230-1 and the removable pad 240-1 either separately from or in combination with the fluid reservoir 250-1. The fluid reservoir 250-2 can be used to effect a step in the particular treatment or to accomplish an additional treatment on the work surface. In other arrangements, the reservoir 250-2 can be used with the tool head 230-1 and with a different removable pad (not shown). In yet other arrangements, the reservoir 250-2 can be used with tool head 230-4 and a removable pad 240-4, all for a different particular treatment on the same or another work surface. The fluid reservoirs 250-1, 250-2 and any additional fluid reservoirs can be configured as described above in Figure 14.

~~[00170]~~[00169] Tool heads 230-1 – 230-5 are all available for use with the system 200 and can be attached to the coupling 220 on the handle portion 210 using the couplings 220-1 – 220-5, respectively. Tool heads 230-1, 230-3, 230-4, 230-5 are shown with removable pads 240-1, 240-3, 240-4, 240-5, respectively. Some tool heads may be used with removable pads and some may not. Removable pads can include sponges, woven cloth, and nonwoven pads. Each tool head 230-1 – 230-5 can be used with one or more fluid reservoirs 250-1, 250-2 and other fluid reservoirs not shown. In other arrangements, some or all of tool heads 230-1 – 230-5 can be used without fluid reservoirs.

~~[00171]~~[00170] In another aspect of the invention, components of the system have indicia which give information to the user about which components are intended to work together. Figure 16 shows a tool head 330-1, a removable pad 340-1 and a fluid reservoir 350-1 all intended to be used together to provide a particular treatment to a work surface. Each of the components 330-1, 340-1, 350-1 contains an indicium 360-1, 360-2, 360-3, respectively. The indicia 360-1, 360-2, 360-3 are shown as dotted triangles in Figure 16A, but they can have a number of different configurations. For example, the indicia

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360-1, 360-2, 360-3 can be visual and involve color, shape, pictures, or text. The indicia can also use sound, for example, individual components can make indicator sounds upon shaking. In other arrangements electric power (from, for example, batteries) can cause an indicator sound to be made when a switch is activated. In yet other arrangements, there can be an electric power source on the handle, which can activate an indicator sound in a tool head, a fluid reservoir, and/or a removable pad as each is attached to the handle. The indicia provide information to the user as to which components are intended to work together. For example, the indicia can signify a work surface, a purpose for surface treatment, a mode of operation, or instructions on treating the work surface.

[00172][00171] Any component can have more than one indicium especially if it is intended for more than one use. Indicia on corresponding components may or may not be strictly identical. For example, an indicium shown as icon on a tool head may be shown on a removable pad in a form larger or smaller than on the tool head. In another example, if an entire tool head intended for carpet cleaning is green, a corresponding removable pad may be entirely green or may have only a green portion somewhere on the pad. A corresponding fluid reservoir may also be either entirely green or have only a green portion. In some arrangements, the corresponding fluid intended for filling the fluid reservoir for carpet cleaning is itself green.

[00173][00172] In some arrangements the system as described includes a set of instructions, which can be combined with a package, carton, or other container associated with the system. The set of instructions can be directly printed on the system itself or can be presented in a separate manner including, but not limited to, a brochure, print advertisement, electronic advertisement, and/or verbal communication, so as to communicate the set of instructions to a user of the system. A set of instructions can also be used as an indicium on a tool head, its associated fluid reservoir, and associated removable pad components wherein the set of instructions describes the specific steps involved in using the tool head, reservoir and pad(s) to effect a treatment to a work surface.



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~~[00174]~~[00173] In other arrangements, as shown in Figure 17, a tool head 430-1 intended for floor cleaning can be used with several different removable pads, such as, for example, a sponge 440-1, an abrasive pad 440-2, and a non-woven disposable pad 440-3. A fluid reservoir 450-1 containing a floor cleaning fluid (not shown) is also part of the system. The reservoir 450-1, the tool head 430-1, and each of the pads 440-1, 440-2, 440-3 have the same indicium, 460-1, 460-2, 460-3, 460-4, 460-5, respectively, indicating that they are all intended for use in floor cleaning. The non-woven disposable pad 440-3 can also be useful for window cleaning and has a window-cleaning indicium 470-3. A fluid reservoir 450-2 for window cleaning and a tool head 430-2 for window cleaning also have the window cleaning indicia 470-1, 470-2, respectively. The indicia 460-x and 470-x show the user which components of the system are intended to be used together.

#### Example

~~[00175]~~[00174] As part of a window-washing activity, a first tool head has an approximately planar surface to which a removable, disposable, non-woven pad is attached. A fluid reservoir contains a fluid suitable for window washing. The first tool head and the fluid reservoir are attached to the handle of the system to treat (wash) a work surface (window). The connection between the first tool head and the handle includes two orthogonal, rotation axes to facilitate movement of the tool head and pad across the window. The fluid reservoir has an electronic pump which can be activated by the user from the hand grip end of the handle. Fluid is dispensed onto the window as the user moves the tool head across the surface, rubbing the window with the disposable, non-woven pad attached to the first tool head.

~~[00176]~~[00175] In order to dry the window, the first tool head is removed from the handle and a second tool head having a squeegee is attached to the handle. The connection between the second tool head and the handle has only one rotational axis. The rotation is approximately parallel to the length of the squeegee and allows the squeegee to be moved up and down the window without lateral motion. No removable pad is used in connection with the second tool head. The user starts at the top of the

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window and moves the squeegee down along the surface to remove residual fluid. After one portion of the window is dried, the user can move to another portion to continue residual fluid removal. The reservoir may or may not be removed before the drying activity according to the desires of the consumer.

~~1001774~~100176 This invention has been described herein in considerable detail to provide those skilled in the art with information relevant to apply the novel principles and to construct and use such specialized components as are required. However, it is to be understood that the invention can be carried out by different equipment, materials and devices, and that various modifications, both as to the equipment and operating procedures, can be accomplished without departing from the scope of the invention itself.